GOVERNMENT OF INDIA
SCIENCE AND TECHNOLOGY
LOK SABHA

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Inventions in Science and Technology
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Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state:

(a) the major inventions/discoveries made in the field of Science and Technology in the country during the last three years and the current year along with the budget allocated therefor;

(b) the steps taken for the commercialisation of the said inventions/ discoveries along with the extent of success achieved as a result thereof;

(c) whether developed countries are depriving India of the latest technology through baseless and time barred restrictions;

(d) if so, whether the scientific endeavours of India have faced any hindrance due to unavailability of states-of the-art foreign technology; and (e) if so, the corrective steps taken by the Government in this regard?

Answer

MINISTER OF STATE IN THE MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTER OF STATE IN THE MINISTRY OF EARTH SCIENCES
(SHRI.Y. S. CHOWDARY)

(a) Several scientific organsations such as Department of Science & Technology (DST), Department of Biotechnology (DBT), Department of Scientific and Industrial Research (DSIR), National Research Development Corporation (NRDC), Indian Council of Agricultural Research (ICAR) have registered new inventions/ discoveries made in the field of Science & Technology in the country during the last three years and the current year.

Under Mega Science programme of DST, a landmark discovery of gravitational waves was made in the field of physics and astronomy. Thirty seven Indian scientists also contributed in this discovery. The discovery of gravitational waves is a fundamental basic research discovery.

In one of the Nano Mission funded projects to promote scientific research in the frontier area of Nano Science and Technology, water purification systems for Arsenic & iron removal using nanotechnology (AMRIT- Arsenic and iron removal by Indian Technology) has been developed and commercialized at IIT-Madras. It functions without electricity which provides arsenic −free drinking water at a cost of less than 5 paise per litre.

Some of the major discoveries made by Indian researchers during last three years and current year include Smart nanoparticles based drug delivery systems, new technique to predict solar cycle. Indian scientists have contributed significantly in the discovery of Higgs Boson popularly known as Boson Particle.

India"s Polar Satellite Launch Vehicle, in its thirty ninth flight (PSLV-C37), launched the 714 kg Cartosat-2 series satellite for earth observation and 103 co-passenger satellites together weighing about 663 kg at lift-off into a 505 km polar Sun Synchronous Orbit (SSO). The co-passenger satellites comprised of 101 nano satellites, one each from Kazakhstan, Israel, The Netherlands, Switzerland, United Arab Emirates (UAE) and 96 from United States of America (USA), as well as two Nano satellites from India. The total weight of all these satellites carried on-board PSLV-C37 was about 1377 kg. The Indian Institute of Astrophysics, Bengaluru designed and built the Ultra Violet Imaging Telescope (UVIT) payload and calibrated in partnership with the Canadian Space Agency; Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune; Tata Institute of Fundamental Research (TIFR); and Indian Space Research Organisation (ISRO). The pay load was successfully integrated and flown on board ASTROSAT satellite on Sept 28th 2015.

Department of Space has developed many technologies viz. Multilayer Printed Antenna Technology, DDV 100 Resin, Dual Polarisation LIDAR, Precision Tapping Mechanism, Photosynthesis Irradiance Incubator Box, CSNM 0102 adhesive, Hard anodising at room temperature, Polymide film including production of Polyamic Acid, Sesco-125 flame retardant coating, EPY 1061 coating compound, BMT ceramic, Benzoxazine Resin, EFA 4330 Film Adhesive, PC-10 Thermal Protection System, Silica Fiber, Silica Granule, Nickel Hydrazine Nitrate.

Sustainable industrial activities using local resources in the rural areas are extremely important for inclusive development of the country. The DST has prioritized interventions for the benefit of rural populations in particular. A Rural-Industry Complex has been established at Malunga village in Jodhpur district of Rajasthan in 2015- 16. Integration of technology in this industry complex has been done in such a manner that satisfies local needs by utilization of local resources, converts waste to wealth in environmentally friendly approaches to fulfill the objectives of Swachch Bharat, Swastha Bharat and Samarth Bharat initiatives.

Photovoltaic integrated Micro Solar Dome, is the simple innovative technology developed with support from Department of Science & Technology to meet the lighting need for people who do not have access to reliable supply of electricity. The product has been included for subsidy under Off Grid and decentralized solar application scheme of Ministry of New and Renewable energy. The Ministry of Rural Development has informed to all States and Union Territories for adopting this innovative technology of Surya Jyoti for the houses constructed under Prime Minister Awas Yojana-Gramin.

The Agharkar Research Institute, Pune had contributed to the development of ten wheat varieties, which include five durum, four aestivum and one dicoccum variety. Soybean variety MACS 1188 was released and notified by the Central Varietal Release & Notification Committee of the Indian Council of Agricultural Research, for cultivation in Southern Zone. Agharkar Research Institute has developed a microbial process for the recovery of crude oil from depleted wells having temperatures exceeding 91Â°C using a consortium of hyperthermophilic bacteria.

Under the Aided institutes supported by DST, Institute of Nano Science and Technology (INST), Mohali has developed a novel nanomaterial for the treatment of industrial and domestic effluents. This invention holds great potential for practical applications in recycling domestic as well as industrial wastewater to solve the problem of water scarcity in the country. Sree Chitra Tirunal Institute for Medical Science & Technology, (SCTIMST) Thiruvananthapuram has developed Harmone releasing intrauterine device "Emily" jointly with a industry partner. The clinical trials of the product have been successfully completed and product has been launched in the market. Raman Research Institute (RRI), Bangalore has invented an Impedance based 'Hand held milk purity testing device' to detect 'synthetic milk adulteration'. A new invention in antenna design was done at RRI to selectively reject bands corrupted by interference in wideband antennas. This enables using wideband antennas for sensitive measurements. International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad has developed photocatalytic TiO2 nanocrystalline particles for sunlight induced self-cleaning textile applications. ARCI has also developed silica aerogel based flexible mats for thermal insulation. The budget allocated for various R&D and related schemes under Department of Science & Technology are Rs. 2921.12 crore for 2014-15; Rs.3854.80 crore for 2015-16 and Rs. 4493.83 crore for 2016-17.

Some of the major inventions/discoveries in the filed of biotechnology are Fecal Incontinence Management device , Auditory Impairment Screening device, Soft Tissue Biopsy device, Ostomy Management Appliance, Limb Immobilization Device, Celiac Disease Diagnostic Kit, Rapid point-of-care typhoid diagnostic Kit, a genetically engineered ascorbic acid-deficient live mutant developed as vaccine candidate for visceral leishmaniosis, diagnostic kit for the onsite detection and identification of Banana Bunchy Top Virus (BBTV).

(b) The process of commercialisation of any invention/discovery involves several steps in technology development chain. The Ministry has set up National Research Development Corporation (NRDC) for commercialisation of indigenously developed technology. NRDC provides value addition to the laboratory scale technologies assigned to it. The services provided by NRDC add value to the lab scale technologies and make them commercialisable which is an indispensable step towards growth of R&D and in turn leads to furtherance of R&D in the country. NRDC has filed about 1700 patents and signed 4874 licence agreements for transfer of technology in different sectors.

The new inventions/ technologies related to agriculture and allied sections generated in ICAR have been filed for protection as patent in the Indian Patent Office and for registration under Protection of Plant Varieties and Farmers' Rights Authority. Agrinnovate India Limited a registered Company has been established by Department of Agricultural Research and Education (DARE) which aims to work on the strengths of DAREs-ICAR and promote the development and spread of R&D outcomes through IPR protection and commercialisation.

The Ministry of Science & Technology has set up Patent Facilitating Cell for filing of patents and also established Technology Development Board of commercialization of indigenous technologies. START-UP NIDHI (National Initiative for Developing and Harnessing Innovations) supports startups/ innovative ideas right from proto-type development to commercialization through a bouquet of 7 programmes. The flagship program of DST, NIDHI Technology Business Incubator has been successful in creating scalable science and technology based ventures and startups.

Women Technology Parks act as a single window hub for convergence of diverse technologies, integrated with forward and backward linkages leading to socio-economic development of women through capacity building and adoption of location-specific technologies, integrated with forward & backward linkages leading to development of women entrepreneurs. So far, 19 Women Technology Parks (WTPs) are fully functional benefitting about 20000 women while 13 WTPs have been established during past two years targeting another 25000 women.

In order to promote entrepreneurship and commercialization of research outcomes in the field of biotechnology, the Government has established "Biotechnology Industry Research Assistance Council" (BIRAC) under the aegis of the Department of Biotechnology (DBT) with the mandate to build the biotechnology innovation ecosystem in the country. Since its inception, BIRAC has provided funding to entrepreneurs, startups, SMEs and translational organizations to the tune of Rs 677 crores which has helped innovation research to bring high quality and affordable products towards commericialisation. The Biodesign programme implemented by the Department of Biotechnology aims to promote medical device innovation and to train the next generation of medical technology innovators by promoting entrepreneurship in medical device sector by creating Startups. NRDC has been successful in taking the lab scale technology to the commercial scale. The number of technologies commercialised during 2013-14 is 19, 2014-15 is 40, 2015-16 is 21 and 2016-17 upto 31.7.2016 is 7. Some of the major technologies licensed to Industry are: Super absorbent Hydrogel developed at Indian Agricultural Research Institute (IARI), New Delhi. Extraction of Azadirachtin from Neem seeds developed at IARI, New Delhi- a neem based Bio-pesticide. Mosquito Larvicide formulation of Bacillus Thuringiensis (BT) -a bio-control agent developed at Vector Control Research Centre (VCRC), Puducherry. Various sericulture related technologies developed by Central Silk Board etc.

Innovative technologies developed and commercialized under Water Technology Initiative (WTI) of DST include technology developed for Dielectric Barrier Discharge (DBD) based plasma system for disinfection. The technology has been successfully transferred for commercialization. A water purifier for arsenic and iron free drinking water, based on iron oxyhydroxide, a nanostructured material to remove arsenic has been developed at IIT Madras, the technology has been transferred to a start up. TiO2 (Titanium dioxide) self-cleaning technology developed at ARCI, Hyderabad is commercialized and the textile garments are launched in the market.

(c) to (e): Scientific endeavours of the country are not facing any hindrance due to unavailability of state-of-the-art foreign technologies. Department of Science & Technology has been working with different countries on joint R&D projects. Collaboration has been initiated with the Rutherford Appleton Laboratory (RAL), UK to access its neutron facility for carrying out research in Nano Science Technology. India has signed the Agreement for Associate Membership of CERN and has become an Associate Member State of CERN on 16th January 2017. The Indo-US consortium has developed the crucial prototype test loop at IISc Bengaluru for development of high temperature concentrated solar power in the country. DST and Research Council-United Kingdome (RC-UK) have agreed to launch India-UK Clean Energy R&D Centre on solar energy, storage and integration. Building upon the Thames-Ganga Partnership and recognizing the importance of clean and portable water, DST and RC-UK have agreed to launch a new collaborative programme on Improving Water Quality and Reusing Waste Water.

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